



## CORRELATION OF RATIO OF ALBUMIN CREATININE URINE WITH SOFA SCORE AS PREDICTOR OF MORTALITY IN SEPSIS PATIENTS IN H. ADAM MALIK GENERAL HOSPITAL MEDAN.

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### ABSTRACT

Sepsis is a systemic response to an infection process that causes organ dysfunction. Urine albumin creatinine ratio has long been used as a predictor of mortality in septic patients/This study aims to Correlation of Ratio of Albumin Creatinine Urine with SOFA Score as Predictor of Mortality in Sepsis Patients in H. Adam Malik General Hospital Medan. Clinical observational analytic study with a prospective cohort design. Samples with non-probability sampling technique with consecutive sampling method as many as 46 people diagnosed with sepsis in an integrated inpatient room, intensive care room of RSUP Haji Adam Malik Medan and fulfill all inclusion and exclusion criteria. Bivariate analysis uses Pearson test if the data is normally distributed, spearman test if it is not normally distributed. The value of albumin creatinine ratio can be used as an alternative as a predictor of mortality of septic patients treated at the ICU of HAM Hospital with a sensitivity of 89% and a specificity of 75%. The value of creatinine albumin ratio showed a significant correlation to the worsening rate on T2 ( $p < 0.05$ ). The ratio of the maximum creatinine ratio has a good predictor value with CI 69.9% - 94.5% ( $p = 0.020$ ). The value of creatinine albumin ratio in patients with sepsis is a predictive factor of mortality in septic patients.

**KEYWORDS** : Sepsis, SOFA score , Ratio Albumin Kreatinin Urine.

### 1. INTRODUCTION

Until now, sepsis is still considered a global health problem that can affect individuals of various ages, in addition to advanced medical management. Sepsis is a systemic response to the infection process. The word sepsis itself comes from the Greek "sepo" which means to damage or make damage. (Namas et al, 2011). Generally, sepsis is characterized by a body's defense response that initiates an inflammatory cascade, in which various proinflammatory molecules are released into the circulatory system. This can trigger endothelial dysfunction which then causes leakage in the capillary system. One manifestation of glomerulus due to increased capiler permeability is the increase in the amount of excretion of protein albumin in the urine known as microalbuminuria. Microalbuminuria was defined as 30-300 albumin excretions mg / day in urine. This is very common in critically ill patients who function as predictors of organ malfunction and mortality rates.<sup>1,3</sup>

Research conducted about microalbuminuria as a predictor of mortality in critical illness. Microalbuminuria was found to be more prevalent in the broad spectrum of critically ill patients studied. In this study, 76% had (Albumin Creatinin Ratio) ACR > 30 mg / g at the time of ICU admission and survived 67% at 24 hours. At 24 hours, 43% of patients had ACR levels of more than 101 mg / g. another study conducted by Tayeh et al. in 2016 showed that the ACR value at 24 hours after treatment was around 110.5 mg / g with a sensitivity of 100% and a specificity of 86% to predict mortality in septic patients. The study concluded that urine ACR can be used as a simple test for the prediction of prognosis and mortality in sepsis. So that in this study the ACR value will be higher as the sepsis process takes place. As previously explained, the SOFA score besides being easy to use, can also link the number of organ dysfunction events with mortality rates in patients with infections treated at UPI. Based on the explanation of several previous studies which showed that the albumin-creatinine ratio of urine could be used as a predictor of mortality in septic patients, the researchers were interested in knowing the relationship between the value of urinary albumin-creatinine ratio with SOFA score as a predictor of mortality in septic patients at Haji Center General Hospital Adam Malik and is not limited to patients treated at UPI.<sup>2</sup>

### METHODS

This research was carried out in an integrated inpatient room and Intensive Care Room of Haji Adam Malik Hospital Medan. The study population was all adult patients diagnosed with sepsis in an integrated inpatient ward, Intensive Care Room of Haji Adam Malik Hospital Medan. Samples with non-probability sampling technique with consecutive sampling method as many as 46 people who were diagnosed with sepsis in the integrated inpatient room, intensive care room of Haji Adam Malik Hospital Medan and fulfilled all the inclusion and exclusion criteria. Inclusion criteria were patients diagnosed with sepsis based on qSOFA criteria and SOFA score, septic patients aged over 18 years, patient / family patients agreed to participate in the study. Exclusion criteria for patients with a history of kidney disease, patients with a history of diabetes mellitus, patients with a history of hypertension, patients with macroscopic hematuria, patients who had been treated in the ICU for more than 48 hours.

**TABLE 1 Patient Distribution Table**

Usia	Jumlah	Persentase	P Value
19 – 38 Tahun	12	26,1 %	0,766
39 – 58 Tahun	24	52,2 %	
>58 Tahun	10	21,7 %	
<b>Jenis Kelamin</b>			
Laki – Laki	22	47,8%	0,872
Perempuan	24	52,2%	

Based on the results obtained and analyzed, there was a significant relationship between the value of the urine albumin creatinine ratio with worsening of sepsis when sepsis was established (T0) ( $p < 0.05$ ) using Pearson correlation.

**TABLE 2. Correlation of research variables when sepsis was established (T0)**

		Cr0	Sfo
Cr0	Pearson Correlation	1	.819**
	Sig. (2-tailed)		.004
	N	46	46

Based on the results obtained and analyzed, there was a significant relationship between the value of the urine albumin creatinine ratio with worsening sepsis ( $p < 0.05$ ) at 48 hours after sepsis was established (T1) using Pearson correlation.

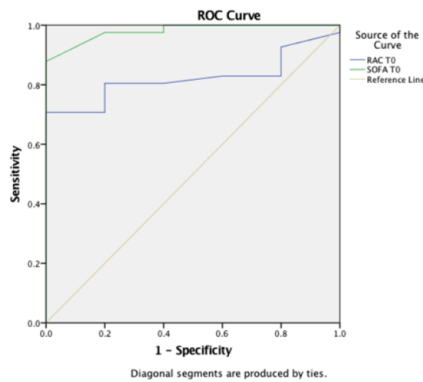
**TABLE 3. Overview of the Ratio of urine albumin creatinine to sepsis worsening at T1**

		Cr1	Sf1
Cr1	Pearson Correlation	1	.750**
	Sig. (2-tailed)		.048
	N	46	46

Based on the results obtained and analyzed, there was a significant relationship between the value of the urine albumin creatinine ratio with worsening sepsis ( $p < 0.05$ ) at 96 hours after sepsis was established (T2) using Pearson correlation.

**TABLE 4. Overview of the ratio of urine albumin creatinine to Sepsis worsening in T2**

		Cr2	Sf2
Cr2	Pearson Correlation	1	.760**
	Sig. (2-tailed)		.0032
	N	46	46

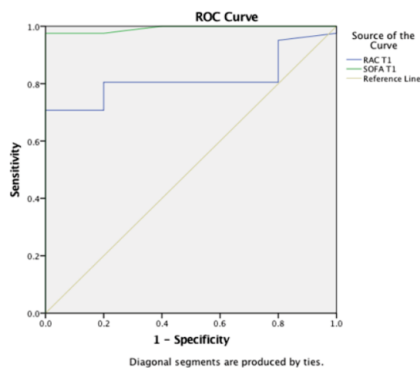


**FIGURE 4.2. Area under the T0 curve**

From the analysis using the ROC curve, it was found that the area under the curve (AUC) of ROC was 81.2% in T1 (95% CI: 68.7% - 93.8;  $p = 0.024$ ). This shows that RAC has a relationship that is directly proportional to the SOFA Score obtained by the area under the curve (AUC) 99.8% in T1 (95% CI: 98.8% - 100%;  $p = 0.000$ ). The results of this analysis can be seen based on the ROC curve attached to Table 4.10 and Figure 4.3.

**TABLE 5. Areas under ROCT1**

Test Result Variable(s)	Area	Std. Error <sup>a</sup>	Asymptotic Sig. <sup>b</sup>	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
RAC T2	.812	.064	.024	.687	.938
SOFA T2	.998	.005	.000	.988	1.000



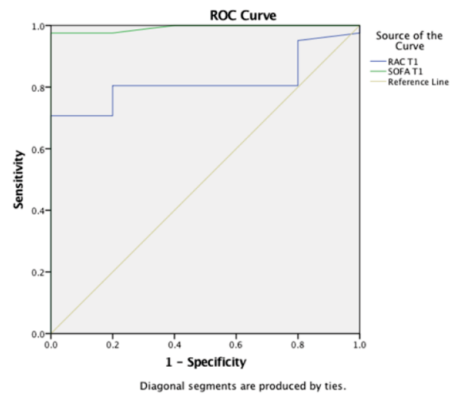
**FIGURE 4.3. Area under T1 Curve**

From the analysis using the ROC curve, it was found that the area under the curve (AUC) ROC was 81.7% on T2 (95% CI: 69.1% - 94.4;  $p = 0.022$ ). This shows that the RAC has a relationship that is directly proportional to the SOFA Score obtained by the area under the curve (AUC) of 99.3% in T2 (95% CI: 97.3% - 100%;  $p = 0.000$ ). The results of this analysis can be seen based on the ROC curve attached to table 4.11 and figure 4.4

**TABLE 6. Areas under ROCT2**

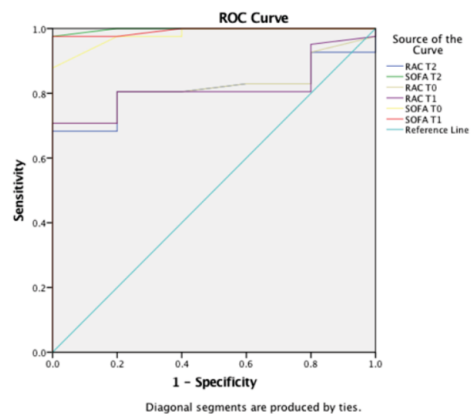
Test Result Variable(s)	Area	Std. Error <sup>a</sup>	Asymptotic Sig. <sup>b</sup>	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
RAC T2	.817	.065	.022	.691	.944
SOFA T2	.993	.010	.000	.973	1.000

**FIGURE 4.4. Area under the T2 curveyable**



**7. Table Area below Kurva T0, T1 dan T2**

Test Result Variable(s)	Area	Std. Error <sup>a</sup>	Asymptotic Sig. <sup>b</sup>	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
RAC T0	.822	.063	.020	.699	.945
RAC T1	.817	.065	.022	.691	.944
RAC T2	.812	.064	.024	.687	.938
SOFA T0	.980	.019	.001	.942	1.000
SOFA T1	.993	.010	.000	.973	1.000
SOFA T2	.998	.005	.000	.988	1.000



**TABLE 4.13. Tabel Uji T**

One Sample Test	Test Value = 0	df	Sig (2-tailed)	Mean difference	95% Confidence Interval of the difference	
					Lower	Upper
	t					
RAC T0	11.543	45	.000	179.413	148.11	210.72
RAC T1	11.501	45	.000	180.348	148.76	211.93
RAC T2	11.555	45	.000	181.739	150.06	213.42

In addition, it is suspected that inflammation causes a defect of the glycocalyx layer in the endothelium that causes microalbuminuria in sepsis. Glycocalyx in fenestrated glomerular capillaries fenestrated functions as a barrier to protein permeability. Degradation from this layer can cause an increase albumin that passes through the glomerulus.

Based on the table 3. an overview of the ratio of creatinine albumin value after 48 hours of uptake of sepsis (T1) found a significant relationship between the value of the ratio of albumin to worsening of sepsis characterized by the results of statistical tests  $p < 0.05$  with the calculation of Pearson correlation. Tayeh et al. also said that the urine albumin creatinine ratio in septic patients was associated with SOFA which led to sepsis worsening from the start of admission to the ICU until 2 days afterwards ( $p = 0.03$ ). Sepsis is characterized by extensive endothelial dysfunction arising from the effects of cytokines, and other inflammatory mediators, which are released during an intense inflammatory response that causes increased systemic capillary permeability. The kidneys receive about 25% of cardiac output, and small changes in glomerular permeability will cause important changes in microalbuminuria, and thus the kidneys are sensitive to changes in permeability. Some researchers write higher levels of microalbuminuria in sepsis against defects in the glycocalyx layer from fenestrated glomerular capillaries induced by the inflammatory process. It has been shown that the glycocalyx layer acts as a barrier to protein permeability and degradation of this layer increases the course of albumin across the glomerulus. This pathological change related to the kidneys can explain renal dysfunction that occurs when the urine albumin creatinine ratio increases.<sup>5,9</sup>

Based on Table 4, the description of urinary albumin creatinine ratio after 96 hours was established by sepsis (T3), there was a significant relationship between the value of albumin creatinine ratio with worsening of sepsis which was indicated by the results of statistical tests  $p < 0.05$  with the calculation of Pearson correlation. This is in line with the results of the study from Seyam et al, who found that the urine albumin creatinine ratio in septic patients compared with the SOFA score had a significant relationship  $p = 0.001$ . Microalbuminuria will be an excellent marker for early identification of patients with a high risk of morbidity and mortality.<sup>5,7</sup>

Another study comparing microalbuminuria values in septic patients with no sepsis found higher microalbuminuria values in septic patients and found impairment in patients who survived within 24 hours so that microalbuminuria values could be used as prognostic markers. Bhadade et al. (2014) found an association between increased mortality in patients with increased microalbuminuria and microalbuminuria in the first 48 hours of treatment with high sensitivity and specificity as a marker of the occurrence of multiple organ failure and acute respiratory failure in adult patients.

In the conclusions drawn, it was stated that the albumin-creatinine ratio below 30 mg/g was closely related to an increased risk of death due to hypertension and cardiovascular disease but was not associated with an increased risk of diabetes mellitus.<sup>4</sup>

## CONCLUSION

The value of creatinine albumin ratio showed a significant correlation to the wording rate on T2 ( $p < 0.05$ ). The albumin creatinine ratio has a good predictor value with CI 69.9% - 94.5% ( $p = 0.020$ ).

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